

Appl. No. 10/648,290
Amendment dated: November 3, 2004
Reply to OA of: August 5, 2004

REMARKS

Applicants have amended the claims to more particularly define the invention taking into consideration the outstanding Official Action. All of the claims have been canceled from the application and replaced with a parallel set of new claims, claim 17-28 as fully supported by Applicants specification. Claim 17 parallels claim 1 and the new dependent claims parallel those dependent claims dependent on claim 1. Claim 23 parallels claim 8 with a similar set of dependent claims. In amending the claims the rejections under 35 USC 112 have been taken into consideration. Applicants most respectfully submit that all the claims now present in the application are in full compliance with 35 U.S.C. 12 and are clearly patentable over the references of record.

The rejection of claims 1-14 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been carefully considered but is most respectfully traversed. Applicants have rewritten the claims as required by the Examiner in the Official Action.

Furthermore, with respect to the presently claimed invention, the method for manufacturing HPC according to the presently claimed invention is adopted for use on a poly-silicon thin film transistor (TFT) manufacturing process that employs a pulsed rapid thermal annealing process to fabricate the HPC.

First, deposit an additional buffer layer (such as SiO₂) on a glass to prevent sodium ions of the glass from diffusing to the active region of the TFT and affecting the characteristics of TFT device; form buffer oxide (3KA)/a-Si(500A)/thin oxide(500A) through continuous chemical vapor deposition; form a metal layer (such as MoW, Cr, or the like) through physical vapor deposition or chemical vapor deposition that has a desired absorption power to infrared radiation and a high thermal stability ; form regional metal distribution on the amorphous Si layer, or called Heating Plate (HP), through photo lithographically and etching process; apply a pulsed rapid thermal annealing process to enable the HP to absorb infrared radiation, and the phonons on the HP

vibrate rapidly so that the vibration energy of the phonons is transferred to the amorphous Si layer by thermal conduction and enable the amorphous Si layer to get sufficient energy to crystallize and become poly-Si layer; then remove the HP and the thin oxide layer by etching (the thin oxide layer exists between the HP and the amorphous Si layer); then form poly-Si island through photo lithographically and etching process. In the island, only a portion of the region requires doping, the rest portion becomes TFT channel. Then deposit gate oxide; deposit Gate Metal (called M1 hereinafter) on the oxide; form M1 patterns through photo lithographically and etching process; form a hard mask of N⁺ doping through M1; form N-type TFTs source and drain regions through N⁺ doping and achieve self-aligned effect. After having finished N⁺ doping, deposit a layer of TEOS-oxide(interlayer) on M1; then form a contact hole (through photo lithographically and etching process) on the source and drain electrodes; fill source and drain metal (called M2 hereinafter) in the contact hole; next, form S/D and metal 2 pad through photo lithographically and etching process; deposit a layer of TEOS-oxide (Passivation) on M2 next activate the HP through PRTP to allow HP (M2) to absorb infrared radiation, and the heated energy obtained by thermal conduction is transferred indirectly to N-type TFTs source and drain regions to activate phosphorus ions to form S/D of a low resistance thus complete fabrication of the poly-Si TFT device. Therefore, this aspect of the rejection is believed to be obviated by the amendments to the claims and the discussion above. Accordingly, it is most respectfully requested that this aspect of the rejection be withdrawn.

In addition, with respect to the claims requiring a thin oxide layer is deposited between the heating plate area(Cr film) and the amorphous Si layer to stop, during the rapid thermal annealing process, any high thermal diffusion between the heating plate area and the amorphous Si layer so as to effectively avoid metal pollution in TFT device channel area.

However no thin oxide layer is deposited between the heating plate area(Cr film) and the amorphous Si layer. When heating plate crystallization takes place, Applicants can receive the signal from Cr element in the amorphous Si layer by EDS analysis. So,

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Applicants can learn that after the heating plate absorbs the infrared radiation, will diffuse the heating plate (Cr film) to the bottom, that is, the amorphous Si layer. The leakage current of the TFT device will increase if metal pollution (elements other than Si) exists. Accordingly, it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 1-3, 5-10 and 12-14 under 35 U.S.C. 103(a) as being unpatentable over Zhang et al., in view of Yamazaki et al. and Sun et al. has been carefully considered but is most respectfully traversed.

With respect to Zhang et al., Applicants claim that the metals (MoW, Cr, W, etc.) in the presently claimed invention come with a feature of better absorption rate to infrared radiation and great stability in extreme heat. However, Zhang, in his choice of metal (Ni, Fe, Co, Ru, Rh, Pd, Os, Ir, Pt, Sc, Ti, V, Cr, Mn, Cu, Zn, Au, Ag, etc.) only needs catalyst to react with a-Si layer to form crystal fracture.

According to Sun, PRTP is well applied in such field. However, compared with its laser platform, our client adopts a RTP platform, with the help of filament, to radiate infrared radiation (wavelength range of the infrared radiation lies in-between 0.76-4 m) in a heated environment. After absorbed by the thermal plate, phonon within will vibrate rapidly to produce energy and transmit such to the a-Si layer by means of heat conduction. In the end the a-Si layer receives enough energy to crystallize poly-Si layer. Sun, adopting a laser platform, with the help of Nd: YAG, Nd: YLF, Nd: YVO₄ (wavelength range of the laser lies in-between 1.2-3.0 m), incomes the ray in predetermined wavelength and make the heat-conductive target structure (such as Al, Ti, Ni, Cu, W, Pt, Au, etc.) produce a large absorption rate. Therefore, in contrast to Sun, Applicants technique keeps a lower cost in platform equipment.

Furthermore, Applicants wish to direct the Examiner attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there

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must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicants also most respectfully direct the Examiner attention to MPEP 2144.08 (page 2100-114) wherein it is stated that Office personnel should consider all rebuttal argument and evidence present by applicant and the citation of In re Soni for error in not considering evidence presented in the specification.

Accordingly, it is most respectfully requested that this rejection be withdrawn in view of the amendments to the claims and the above discussion.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,
BACON & THOMAS, PLLC

By: 
Richard E. Fichter
Registration No. 26,382

625 Slaters Lane, 4th Fl.
Alexandria, Virginia 22314
Phone: (703) 683-0500
Facsimile: (703) 683-1080
REF:kdd
A01.revised.wpd
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